

## U.S. Army Capstone Depleted Uranium Aerosols Study & Human Health Risk Assessment

*For Service members and their Families*

### Important Facts

- The Capstone Depleted Uranium Human Health Risk Assessment determined there would be little or no impact on the health of service members who breathe in depleted uranium (DU) dust particles while inside tanks or other vehicles hit by DU munitions.
- The Capstone DU Aerosols Study showed that operating vehicle ventilation systems are very effective in reducing DU particle concentrations and, therefore, reducing potential DU exposures to personnel inside the vehicles.
- The Departments of Defense (DoD) and Veterans Affairs are committed to fully addressing the health concerns of individuals with DU exposures. DoD continues to screen personnel for DU exposure and the VA continues to monitor those with confirmed DU exposures for possible long-term health problems.
- Depleted uranium weapons and armor save U.S. service members' lives by providing more effective weapon systems on the battlefield.

### What is depleted uranium (DU)? What is different about depleted uranium and natural uranium? How is depleted uranium used?

Depleted uranium (DU) is a form of uranium, a naturally occurring, slightly radioactive heavy metal found in many parts of the world. DU is the byproduct of enriching uranium for use in nuclear weapons and nuclear power plants. It is 40 percent less radioactive than natural uranium. People are routinely exposed to natural uranium in food, water, and air. The health effects of natural uranium, which has the same chemical properties as DU, are very well understood and are based on 50 years of scientific research.

The military uses DU in armor penetrating munitions fired by Abrams tanks, Bradley Fighting Vehicles, and several aircraft systems. Depleted uranium is also used as armor for Abrams tanks. Commercial uses of DU include aircraft and sailing ship counterweights and radiation shielding of industrial and medical radiation sources.

### How might service members be exposed to DU?

Service members might be exposed to DU when they occupy vehicles hit by DU munitions, rescue occupants from those vehicles, or perform other operational duties involving these vehicles (equipment removal, repair, salvage, etc.). Exposures can occur when someone is wounded and retains fragments that contain DU in his or her body, or breathes air containing DU dust, or transfers DU dust from contaminated surfaces to the mouth or to open wounds. DU must be taken into the body to be a potential health hazard.

### What was the Capstone DU Project and why was it done?

The Capstone DU Project was composed of both the Capstone DU Aerosols Study and the Capstone DU Human Health Risk Assessment. The Capstone DU Project was sponsored by the U.S. Army (Heavy Metals Office and USACHPPM) and the DoD Deployment Health Support Directorate. Its purpose was to provide a peer-reviewed, rigorous scientific estimate of any health risks associated with breathing DU particles. The study focused on service members who may have been in or around armored vehicles when hit by large-caliber DU munitions. While the health hazards of DU are well understood, the military recognized that more information was needed about the DU aerosols inside armored vehicles to predict possible health risks from aerosol exposure.

The Capstone DU Project had two major phases:

- The first phase, the Capstone DU Aerosols Study, involved the collection and comprehensive analysis (particle size, air concentration, etc.) of DU aerosols produced in an Abrams tank and a Bradley Fighting Vehicle struck by large-caliber DU munitions. Aerosol particles were collected and analyzed to determine the air concentration, the DU content and other characteristics of the resulting DU particles affecting their ability to be inhaled and absorbed by the body.
- The second phase, the Capstone DU Human Health Risk Assessment, used the data from the first phase to

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*A collaborative effort between the Air Force Institute for Operational Health, the Deployment Health Clinical Center, Force Health Protection and Readiness, the Navy Environmental Health Center, the U.S. Army Center for Health Promotion and Preventive Medicine, and the OUSD(P&R)/Military Family and Community Policy*



calculate radiation doses and possible DU concentrations in the body. The exposures were based on the amount of time crewmembers were expected to remain inside their vehicles after it was struck. This information was then combined with comprehensive reviews of uranium's hazards by scientific organizations from around the world to identify any resulting potential health effects.

- The cost of this project was more than \$6 million.

### Who did the Capstone DU Project?

The Capstone DU Project was conducted by a multidisciplinary team of government (U.S. Army Aberdeen Test Center, U.S. Army Armament Research, Development, and Engineering Center, and USACHPPM) and master scientists from Battelle Memorial Institute, Pacific Northwest National Laboratory, Los Alamos National Laboratory, and the Lovelace Respiratory Research Institute. The test plans, methodologies and scientific reports were all peer-reviewed by an independent team of U.S. nationally recognized experts.

### What were the Capstone DU Project results, and what do they mean?

The Capstone DU Human Health Risk Assessment determined that health risks associated with breathing in DU particles would be very low, even for service members inside tanks or other vehicles hit by DU munitions, and that there would be little or no impact on their health. Long-term adverse health effects are not expected in service members with DU exposures comparable to the Human Health Risk Assessment exposures.

The Capstone DU Aerosols Study confirmed the value of ventilation in reducing possible exposures to DU aerosols and clearly showed that simply getting out of DU struck vehicles, if operational conditions permit, provides a way to significantly minimize exposure.

### Is medical testing available to service members who were potentially exposed to DU?

Yes. DoD policy requires that all personnel, including those wounded, who were in, on, or near (less than 50 meters) a combat vehicle at the time it was struck by DU munitions and all

personnel who entered the vehicle immediately after it was struck (e.g., to attempt rescue of personnel) be tested. These personnel are required to complete a DU exposure assessment form and have a 24-hour urine test as soon as feasible. Also, all service members with specific military occupational specialties, who were required to enter multiple vehicles damaged by DU munitions, are also required to complete a DU exposure assessment form and have a urine test. Most often this occurs at the time of redeployment to the service member's home station. All other personnel with possible contact with DU are categorized as "incidentally-exposed," and no urine DU testing is required because their exposure, if any, will be minimal. Service members with incidental DU exposures, who desire to be tested, may request a test when consulting with a healthcare provider. Active duty personnel may request this test at a military treatment facility. Veterans who are separated may request this test at a VA Medical Center. Service members who test positive for DU are offered referral to the Veterans Affairs Depleted Uranium Medical Follow-up Program at the Baltimore VA Medical Center.

### Where can I obtain answers regarding specific technical questions?

The full-text reports from the Capstone DU Aerosols Study & Human Health Risk Assessment, as well as other information about DU, can be found at:  
[http://deploymentlink.osd.mil/du\\_library/](http://deploymentlink.osd.mil/du_library/)

For specific technical questions on the Capstone DU Aerosols Study & Human Health Risk Assessment, contact the DoD Health Affairs Deployment Health Support Directorate. For specific military service-related issues with DU policies, operations, and health issues, contact the service points of contact listed below.

### Where Do I Get More Information?

Air Force Institute for Operational Health (AFIOH)  
Phone: (888) 232-3764  
<http://www.brooks.af.mil/afioh/>

DoD Force Health Protection & Readiness (FHP & R)  
Phone: (800) 497-6261  
<http://fhp.osd.mil>

U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM)  
Phone: (800) 222-9698  
<http://chppm-www.apgea.army.mil>

DoD Deployment Health Clinical Center (DHCC)  
Phone: (866) 559-1627  
<http://www.pdhealth.mil/>

Navy Environmental Health Center (NEHC)  
Phone: (757) 953-0700  
<http://www-nehc.med.navy.mil>



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